

What is claimed is:

1. A method of removing dry-film contaminants from a dry-film solution, comprising:

first applying a dry-film removal solution to a semiconductor wafer to remove a dry-film from the semiconductor wafer, said dry-film removal solution containing dry-film;

circulating said dry-film removal solution;

collecting said circulated dry-film removal solution;

pre-filtering said dry-film removal solution, thereby removing said dry-film from said collected dry-film removal solution; and

second applying a dry-film removal solution to said at least one semiconductor wafer.

2. The method of claim 1, wherein said circulating said dry-film removal solution comprises providing means for circulating said dry-film removal solution from said first applying to said collecting to said pre-filtering to said second applying a dry-film removal solution, further providing at least one fluid control valve with interconnecting tubing for flow of dry-film removal solution there-through and at least one pump for propulsion of dry-film removal solution there-through.

3. The method of claim 1, said pre-filtering being intermittently applied with time-periods between successive applications, assuring that the pre-filtering is not at all times part of a dry-film removal circulation loop.

4. The method of claim 1, whereby by-products of the dry-film pre-filtering from the dry-film removal solution will be dissolved and returned to the solution.

5. The method of claim 4, whereby said dissolving and returning to the solution of said by-products is dependent on the time of operation of the dry-film pre-filtering.

6. The method of claim 1, said pre-filtering comprising valves and a pre-filter module.

7. The method of claim 6, said valves and a pre-filter module comprising control capabilities such that said valves and pre-filter module can be adjusted as a function of the time of operation of the pre-filter module.

8. The method of claim 1, said pre-filter comprising traps, whereby said dry-film removal solution not being permanently embedded in said traps.

9. The method of claim 1, whereby by-products that are pre-filtered are not returned to the dry-film removal solution.

10. The method of claim 1, further providing for conventional circulation of the dry-film removal solution by closing a pre-filter valve.

11. The method of claim 1, whereby effectiveness of said pre-filtering is dependent on a Stripping Rate and Trapping Rate of the dry-film removal solution.

12. The method of claim 1, said pre-filtering preferably being applied for a period of between about 5 minutes and 15 minutes after initiation of said circulating of the dry-film removal solution.

13. The method of claim 1, wherein said dry-film removal solution comprises SPS-200(DMSO) or KOH, applied at a processing temperature of about 60 degrees C, whereby a chemical composition of SPS-200 is 92% DMSO and 2% TMAM.

14. The method of claim 1, whereby an operational temperature of the pre-filtering is constant.

15. The method of claim 1, wherein an optimum operational temperature is established with as objective of achieving an optimum Stripping Rate.

16. The method of claim 1, whereby pre-filtering is preferably applied to solder bump processes.

17. The method of claim 1, wherein a preferred flow-rate of the dry-film removal solution is about 20 liter/minute (LPM).

18. The method of claim 1, said pre-filtering comprising control valves, said control valves being controlled in an inter-dependent manner.

19. The method of claim 18, wherein said control valves are applied for purposes of maintenance and of flow by-pass of dry-film removal solution and for normal return of dry-film removal solution.

20. The method of claim 1, wherein said dry-film solution is not replaced during said pre-filtering.

21. The method of claim 1, wherein said dry-film solution is replaced during said pre-filtering, resulting in improving effectiveness in removing dry-film from the dry-film solution.

22. The method of claim 1, said pre-filtering comprising at least one trap for filtering of said dry-film removal solution, said trap comprising a structure having square or rectangular sides.

23. The method of claim 22, wherein said at least one trap has an entry port, said entry port having dimensions of about 100 mm x 120 mm, said trap having a preferred height of about 150 mm.

24. An apparatus for removing dry-film contaminants from a dry-film solution, comprising:

- a means for first applying a dry-film removal solution to a semiconductor wafer to remove a dry-film from the semiconductor wafer, said dry-film removal solution containing dry-film;

- a means for circulating said dry-film removal solution;

- a means for collecting said circulated dry-film removal solution;

- a means for pre-filtering said dry-film removal solution, thereby removing said dry-film from said collected dry-film removal solution; and

a means for second applying a dry-film removal solution to said at least one semiconductor wafer.

25. The apparatus of claim 24, wherein said means for circulating said dry-film removal solution comprises providing means for circulating said dry-film removal solution from said first applying to said collecting to said pre-filtering to said second applying a dry-film removal solution, further providing at least one fluid control valve with interconnecting tubing for flow of dry-film removal solution there-through and at least one pump for propulsion of dry-film removal solution there-through.

26. The apparatus of claim 24, said means for pre-filtering being intermittently applied with time-periods between successive applications, assuring that the pre-filtering is not at all times part of a dry-film removal circulation loop.

27. The apparatus of claim 24, whereby by-products of the dry-film pre-filtering from the dry-film removal solution will be dissolved and returned to the solution.

28. The apparatus of claim 27, whereby said dissolving and returning to the solution of said by-products is dependent on the time of operation of the means for dry-film pre-filtering.

29. The apparatus of claim 24, said means for pre-filtering comprising valves and a pre-filter module.

30. The apparatus of claim 29, said valves and a pre-filter module comprising control capabilities such that said valves and pre-filter module can be adjusted as a function of the time of operation of the means for pre-filtering.

31. The apparatus of claim 24, said means for pre-filtering comprising traps, said dry-film removal solution not being permanently embedded in said traps.

32. The apparatus of claim 24, whereby by-products that are pre-filtered are not returned to the dry-film removal solution.

33. The apparatus of claim 24, further comprising means for circulation of the dry-film removal solution by closing a pre-filter valve.

34. The apparatus of claim 24, whereby effectiveness of said means for pre-filtering is dependent on a Stripping Rate and Trapping Rate of the dry-film removal solution.

35. The apparatus of claim 24, said means for pre-filtering preferably being applied for a period of between about 5 minutes and 15 minutes after initiation of said circulating of the dry-film removal solution.

36. The apparatus of claim 24, wherein said dry-film removal solution comprises SPS-200(DMSO) or KOH, applied at a processing temperature of about 60 degrees C, whereby a chemical composition of SPS-200 is 92% DMSO and 2% TMAM.

37. The apparatus of claim 24, whereby an operational temperature of the means of pre-filtering is constant.

38. The apparatus of claim 24, wherein an optimum operational temperature is established with as objective of achieving an optimum Stripping Rate.

39. The apparatus of claim 24, whereby said means for pre-filtering is preferably applied to solder bump processes.

40. The apparatus of claim 24, wherein a preferred flow-rate of the dry-film removal solution is about 20 liter/minute (LPM).



41. The apparatus of claim 24, said means for pre-filtering comprising control valves, said control valves being controlled in an inter-dependent manner.

42. The apparatus of claim 41, wherein said control valves are applied for purposes of maintenance and of flow by-pass of dry-film removal solution and for normal return of dry-film removal solution.

43. The apparatus of claim 24, wherein said dry-film solution is not replaced during said pre-filtering.

44. The apparatus of claim 24, wherein said dry-film solution is replaced during said pre-filtering, resulting in improving effectiveness in removing dry-film from the dry-film solution.

45. The apparatus of claim 24, said means for pre-filtering comprising at least one trap for filtering of said dry-film removal solution, said trap comprising a structure having square or rectangular sides.

46. The apparatus of claim 45, wherein said at least one trap has an entry port, said entry port having dimensions of about 100 mm x 120 mm, said trap having a preferred height of about 150 mm.

47. An apparatus for removing dry-film contaminants from a dry-film solution, comprising:

first applying a dry-film removal solution to a semiconductor wafer to remove a dry-film from the semiconductor wafer, said dry-film removal solution containing dry-film;

circulating said dry-film removal solution;

collecting said circulated dry-film removal solution;

pre-filtering said dry-film removal solution, thereby removing said dry-film from said collected dry-film removal solution; and

second applying a dry-film removal solution to said at least one semiconductor wafer.

48. The apparatus of claim 47, wherein said circulating said dry-film removal solution comprises providing means for circulating said dry-film removal solution from said first applying to said collecting to said pre-filtering to said second applying a dry-film removal solution, further providing at least one fluid control valve with interconnecting tubing for flow of dry-film removal solution there-through and at least one pump for propulsion of dry-film removal solution there-through.

49. The apparatus of claim 47, said pre-filtering being intermittently applied with time-periods between successive

applications, assuring that the pre-filtering is not at all times part of a dry-film removal circulation loop.

50. The apparatus of claim 47, whereby by-products of the dry-film pre-filtering from the dry-film removal solution will be dissolved and returned to the solution.

51. The apparatus of claim 50, whereby said dissolving and returning to the solution of said by-products is dependent on the time of operation of the means for dry-film pre-filtering.

52. The apparatus of claim 47, said pre-filtering comprising valves and a pre-filter module.

53. The apparatus of claim 52, said valves and a pre-filter module comprising control capabilities such that said valves and pre-filter module can be adjusted as a function of the time of operation of the means for pre-filtering.

54. The apparatus of claim 47, said pre-filtering comprising traps, said dry-film removal solution not being permanently embedded in said traps.

55. The apparatus of claim 47, whereby by-products that are pre-filtered are not returned to the dry-film removal solution.

56. The apparatus of claim 47, further comprising circulation of the dry-film removal solution by closing a pre-filter valve.

57. The apparatus of claim 47, whereby effectiveness of said means for pre-filtering is dependent on a Stripping Rate and Trapping Rate of the dry-film removal solution.

58. The apparatus of claim 47, said pre-filtering preferably being applied for a period of between about 5 minutes and 15 minutes after initiation of said circulating of the dry-film removal solution.

59. The apparatus of claim 47, wherein said dry-film removal solution comprises SPS-200(DMSO) or KOH, applied at a processing temperature of about 60 degrees C, whereby a chemical composition of SPS-200 is 92% DMSO and 2% TMAM.

60. The apparatus of claim 47, whereby an operational temperature of pre-filtering is constant.

61. The apparatus of claim 47, wherein an optimum operational temperature is established with as objective of achieving an optimum Stripping Rate.

62. The apparatus of claim 47, whereby said pre-filtering is preferably applied to solder bump processes.

63. The apparatus of claim 47, wherein a preferred flow-rate of the dry-film removal solution is about 20 liter/minute (LPM).

64. The apparatus of claim 47, said pre-filtering comprising control valves, said control valves being controlled in an inter-dependent manner.

65. The apparatus of claim 64, wherein said control valves are applied for purposes of maintenance and of flow by-pass of dry-film removal solution and for normal return of dry-film removal solution.

66. The apparatus of claim 47, wherein said dry-film solution is not replaced during said pre-filtering.

67. The apparatus of claim 47, wherein said dry-film solution is replaced during said pre-filtering, resulting in improving effectiveness in removing dry-film from the dry-film solution.

68. The apparatus of claim 47, said pre-filtering comprising at least one trap for filtering of said dry-film removal solution, said trap comprising a structure having square or rectangular sides.

69. The apparatus of claim 68, wherein said at least one trap has an entry port, said entry port having dimensions of about 100 mm x 120 mm, said trap having a preferred height of about 150 mm.